REMARKS

Favorable reconsideration, reexamination, and allowance of the present patent application are respectfully requested in view of the foregoing amendments and the following remarks.

Allowable Subject Matter

Applicant again gratefully acknowledges the indication, at pages 1 and 7 of the Office Action, that the subject matter of Claim 10 is free of the prior art.

Rejection under 35 U.S.C. § 103(a)

In the Office Action, beginning at page 2, Claims 1-3, 5, 8, and 9 were again rejected under 35 U.S.C. § 103(a), as reciting subject matters that allegedly are obvious, and therefore allegedly unpatentable, over *GB '875*, in view of the disclosure of *Säpper*. Claims 1-5, 8, 9 were again rejected under section 103(a) over the disclosure *Davidson*, in view of *Säpper*. Claims 6 and 7 were again rejected under section 103(a) over the disclosures of *GB'875* or *Davidson*, in view of *Säpper*, and further in view of *Jampen*. Claim 11 was again rejected under section 103(a) over the disclosures of *GB'875* or *Davidson*, in view of *Säpper*, and further in view of *Kudlacik*. Claim 12 was, lastly, again rejected under section 103(a) over the disclosures of *GB'875* or *Davidson*, in view of *Säpper*, and further in view of *Crowdy*. Applicant respectfully requests reconsideration of these rejections.

Applicant has, in a response to a prior Office Action, described in detail some aspects of the present invention, and provided detailed descriptions of the prior art upon which the Office Action relies to reject the claims. Applicant does not herein repeat those discussions in an effort to not burden the record with redundancies, and merely incorporates them by reference.

As discussed in this application, one aspect of the present invention includes a generator that has, among other things, an auto-ventilation feature. Because of the selection of the path of a coolant through the various elements in the generator, and the inclusion of a coolant fluid at a superatmospheric pressure inside the sealed enclosure of the generator, there is no need to waste some of the rotational energy of the rotor on driving an internal coolant fan. Thus, a generator in

embodying principles of the present invention is, within the enclosure, fan-less and, thus, can be more efficient.

Claim 1 relates to a generator having a combination of elements, including a rotor and stator with a gap between the rotor and the stator, the gap having ends, baffles at the ends of the gap, a substantially hermetically sealed enclosure filled with a gaseous coolant at superatmospheric pressure and including a coolant receiving region, the rotor and the stator positioned in the enclosure, and wherein no fan is located in the enclosure, the stator including a core, cooling ducts in the stator core, and windings which form a winding overhang at each end of the stator, the rotor including cooling channels, wherein, when the generator is operating, and when the generator is in fluid communication with a cooling apparatus, gaseous coolant flows in a circuit from the cooling apparatus at least partially through the winding overhangs, then through cooling channels in the rotor, then into said gap, then through the cooling ducts in the stator core into the coolant receiving region, and then through the cooling apparatus, the baffles configured and arranged to both inhibit escape of the gaseous coolant from the ends of said gap and inhibit entry of the gaseous coolant into the gap through the gap ends, the flow of gaseous coolant around said cooling circuit being caused solely by centrifugal force acting on the gaseous coolant in the cooling channels of the rotor when said rotor rotates.

The prior art, including *GB '875*, *Säpper*, *Davidson*, *Jampen*, *Kudlacik*, and *Crowdy*, fails to disclose, describe, or suggest combinations of elements as recited in the pending claims.

GB '875 describes a dynamo-electric machine that relies on axial flow fans 31 to propel coolant through the various passageways in its generator's subcomponents. Indeed, *GB '875* provides unlabeled partitions, illustrated at the far right of Fig. 3 thereof, which directs coolant to the low-pressure side of the fans 31. At page 3, lines 17-30, *GB '875* describes how the fans 31 circulate the 'ventilating medium' through the several subcomponents of the generator described in *GB '875*. Similarly, *Davidson* provides centrifugal fans 23 mounted on the rotor, with a shroud 25, purposefully to direct hydrogen through *Davidson*'s generator's cooling circuit. See page 2, lines 16-31, 45-55, and 62-70. *Davidson* even goes so far as to indicate that the centrifugal fans 23 can be replaced with multi-stage axial fans.

Nowhere does *GB '875* or *Davidson* recognize that the fans 31 (*GB '875*) and 23 (*Davidson*) could be eliminated from its generator, likely because neither document recognizes that the rotor alone can produce sufficient centrifugal force to circulate its hydrogen coolant.

Säpper's disclosure is concerned with a dynamo-electric machine having cooling that is quite different from those of *GB '875* and *Davidson*, as *Säpper* does not describe the coolant as being under pressure, and because Figs. 1 and 3 clearly illustrate that the cooling gas flow (arrow 20) comes from outside the machine's casing C and into the inlet space 4. Thus, what *Säpper* describes is plainly an open ventilation machine, and *Säpper*'s housing is not a substantially hermetically sealed enclosure. On such open ventilation machines, the absence of a separate and elaborate fan within the housing might be expected, because the external source of the air can provide an additional pressure and/or velocity increase to the flow prior to being admitted into the casing C. *Säpper* specifically defines the internal space 12 as including the outflow space 3, while "the dividing device 8 forms a virtually gas-tight partition between the stator-rotor space 12 and the flow inlet space 4 at each end of the casing [C]", col. 2, lines 62-64, without describing any other outlet for the gas from the outflow space 3. *Säpper* provides stator pressure plate 6, between the inlet space 4 and the outlet space 3, specifically to maintain the pressure in the outlet space, and plainly refuses to permit gas to circulate directly into the inlet space 4. Thus, because of *Säpper*'s indication that device 8 forms a gas-tight seal between spaces 4 and 12, there is no internal recirculation of the gas within the casing C, and the gas must exit from the casing. The only way to thus reintroduce a coolant gas into the space 4, given *Säpper*'s description, is by providing external devices to cool the gas and deliver it along stream 20. *Säpper* offhandedly mentions that the cover plate 30 can be replaced with a centrifugal fan 32 (see Fig. 4), and indicates that it is "unnecessary".

The Office Action attempts to address this deficiency in *Säpper*'s disclosure, stating:

> [T]he arrow 20 is schematic in nature and, absent any specific teaching in Sapper [sic], indicates only the fact that there is inflow and outflow of cooling gas into the respective inlet and outlet spaces. The drawings cannot be relied upon to teach elements when the drawings in light of the specification do not clearly teach such elements to one of

> ordinary skill. Sapper's [sic] disclosure is silent regarding the nature of the inflow of cooling gas and whether or not it is pressurized, neither [sic] is there anything in the disclosure that would imply that Sapper [sic] must be an open-ventilation machine. Sapper [sic] only says that reference number 20 is a "cooling gas" (c.3, line 6) or "cooling-gas stream" (c.3, line 25). There is no suggestion as to the nature or structure of the source of the gas or gas stream.

(Office Action, page 8). This statement in the Office Action ignores the foregoing descriptions in *Säpper* of the seals between spaces and the roll of the sealing device 8.

Applicant respectfully submits that a person of ordinary skill in the art would not look to *Säpper* to solve a problem not identified by *Säpper*, *Davidson*, or *GB '875*, and combine the features of the machines described therein as suggested in the Office Action. Because *Säpper* plainly contemplates reliance on external devices for cooling the gas and flowing the gas to the casing C, those of ordinary skill in the art, upon a full and fair reading of the prior art, would not look to the open-casing generator of *Säpper* to address unidentified problems in the sealed-enclosure generators of *Davidson* and *GB '875*. The Office Action alleges that the three documents are in analogous arts, because they relate to generators and generator cooling. This statement ignores the significant differences in the flow characteristics of both classes of machines: open-casing machines can rely on pressure and flow generated outside the casing, thus reducing concerns about the flow characteristics of the generator's rotor and stator because additional energy can be supplied from outside the generator; while those of skill in the art would focus much more intently on the geometries of the internal passages in sealed-enclosure generators, because inadequate flow through them would cause the generator to overheat. Thus, one of ordinary skill in the art would not look to the relatively cavalier art of open-casing generators for cooling solutions in the significantly more rigorously defined art of sealed-enclosure generators. *Säpper*'s 'take-it-or-leave-it' discussion of centrifugal fan 32 underscores the differences, and therefore lack of analogy between, open-casing and sealed-enclosure generators, because the skilled artisan knows that reliance can be had on the external sources of pressure and flow.

Furthermore, the modifications of the generators described in *Davidson* and *GB '875*, alleged in the Office Action to be obvious, would be expected by those of ordinary skill in the art to produce a generator that would overheat. There is no disclosure in any of the prior art that the elimination of the fans in the generators of *Davidson* and *GB '875* could be effected without providing some other source of coolant pressure and flow; *Säpper* essentially indicates that one must make the generator with an open casing C so that external flow can be provided. Plainly put, the Applicants herein are the first to have discovered that a sealed-enclosure, superatmospheric generator can adequately cool itself without resort to energy-wasteful internal fans.

Concerning Claim 5 and the opinion expressed in the Office Action that it would have been obvious for someone skilled in the art to provide a range of at least 10 bar for the superatmospheric pressure within the machine, Applicant respectfully disagrees. In addition to the points Applicant has previously made concerning Claim 5, the present specification makes clear that the high internal pressures of the coolant in the enclosure results in higher heat capacity in the coolant, at least in part because of its increased density. None of the prior art identifies that this increased pressure in a sealed-enclosure generator would result in better cooling, and Applicant's specification specifically justifies the usefulness of this feature. Accordingly, Applicant has, contrary to the statement in the Office Action, provided a sound technical reason why the claimed superatmospheric pressures would not have been merely an obvious optimum range.

Jampen, *Kudlacik*, and *Crowdy* fail to remedy the deficiencies of *GB '875*, *Davidson*, and *Säpper* with respect to the subject matters of the pending claims, at least for the reasons previously presented.

For at least the foregoing reasons, Applicant respectfully submits that the subject matters of Claims 1-9, 11, and 12, each taken as a whole, would not have been obvious to one of ordinary skill in the art at the time of Applicant's invention, are therefore not unpatentable under 35 U.S.C. § 103(a), and therefore respectfully requests withdrawal of the rejection thereof under 35 U.S.C. § 103(a).

New Claims

Claims 13 and 14 have been added as new claims dependent from independent Claim 1, and are therefore allowable for at least the same reasons. Claim 13 relates to a generator as claimed in claim 1, wherein the baffles are configured and arranged to direct substantially all of the coolant between the winding overhangs, while Claim 14 relates to a generator as claimed in claim 1, wherein the baffles comprise baffles extending towards said winding overhangs to direct coolant towards the winding overhangs. Support for these claims can be found throughout the application, including the drawings and paragraph [0016]. By way of non-limiting example, the generator can include baffles 14. None of the prior art discloses, describes, or suggests baffles as recited in the combinations of Claims 13 or 14, and therefore these claims are further patentable.

Conclusion

Applicant respectfully submits that the present patent application is in condition for allowance. An early indication of the allowability of this patent application is therefore respectfully solicited.

If Mr. Mullins believes that a telephone conference with the undersigned would expedite passage of this patent application to issue, he is invited to call on the number below.

It is not believed that extensions of time are required, beyond those that may otherwise be provided for in accompanying documents. If, however, additional extensions of time are necessary to prevent abandonment of this application, then such extensions of time are hereby petitioned under 37 C.F.R. § 1.136(a), and the Commissioner is hereby authorized to charge fees necessitated by this paper, and to credit all refunds and overpayments, to our Deposit Account 50-2821.

Respectfully submitted,

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